CLAIMS

We claim:

1. A magnetic media having a timing based servo track written by a magnetic recording head having a timing based gap pattern, the magnetic recording head comprising:

a substrate;

a magnetically permeable thin film deposited onto the substrate; and

a gap pattern milled through the magnetically permeable thin film using a focused ion beam, wherein the gap pattern formed by the focused ion beam is matched to a visually defined gap pattern and wherein the focused ion beam is oriented in a direction that is parallel with a resulting gap depth through the magnetically permeable thin film.

2. The magnetic media of claim 1, wherein the magnetic media is magnetic tape.

3. The magnetic media of claim 1, wherein the recording head further comprises a coil coupled to the substrate, wherein the coil controllably causes magnetic flux to flow through the substrate and the thin film.

4. The magnetic media of claim 1, wherein the substrate of the recording head further comprises a pair of ferrite blocks bonded to a ceramic member wherein an upper surface of the bonded blocks and ceramic member is polished.

5. The magnetic media of claim 4, wherein the upper surface of the recording head has a curvature.

6. The magnetic media of claim 1, wherein the thin film of the recording head includes material sputtered onto the substrate to produce the thin film.

7. The magnetic media of claim 6, wherein the sputtered material of the recording head has a high magnetic moment density.

8. The magnetic media of claim 6, wherein the sputtered material of the recording head is chosen from the family of iron nitride alloys.

9. The magnetic media of claim 6, wherein the sputtered material of the recording head is FeXN.

10. The magnetic media of claim 6, wherein the sputtered material of the recording head is FeAlN.

11. The magnetic media of claim 6, wherein the sputtered material of the recording head is FeTaN.

12. The magnetic media of claim 6, wherein the sputtered material of the recording head is sputtered to form a thin film having a thickness between 1 to 5 μm.

13. The magnetic media of claim 1, wherein the gap pattern of the recording head is defined by a visual indication of the pattern on the thin film.

14. The magnetic media of claim 13, wherein the gap pattern of the recording head is a timing based servo pattern.

15. The magnetic media of claim 13, wherein the visual indication of the recording head is provided by an applied layer of photoresist over at least a portion of the thin film, wherein the photoresist is masked and a portion of the photoresist is removed using a chemical process.

16. The magnetic media of claim 15, wherein the gap pattern defined on the recording head is a timing based servo pattern.

17. The magnetic media of claim 1, wherein the gap pattern of the recording head is defined by entering the numerical coordinates of the gap pattern into a control system of the focused ion beam, wherein the visually defined pattern provides a reference point from which numerical coordinates are based.

18. The magnetic media of claim 17, wherein the gap pattern defined on the recording head is a timing based servo pattern.

19. The magnetic media of claim 1, wherein the focused ion beam is substantially perpendicular to an upper major surface of the thin film of the recording head during milling.

20. The magnetic media of claim 19, wherein the gap of the recording head has nearly vertical side walls.

21. The magnetic media of claim 1, wherein the gap of the recording head has nearly vertical side walls.

22. A magnetic tape having a timing based servo pattern written thereon by a magnetic recording head having a timing based pattern, the magnetic recording head comprising:

a magnetically permeable substrate having two ferrite blocks glass bonded to a medially disposed ceramic member;

a magnetically permeable thin film sputtered onto one surface of the substrate thereby providing a major surface, wherein a focused ion beam is rastered in a plane orthogonal to the plane of the major surface of the thin film and parallel to a gap depth, milling out the thin film defined by a visually defined gap pattern, wherein the gap

pattern formed by the focused ion beam is matched to the visually defined pattern; and

a coil coupled to the substrate, wherein the coil controllably causes magnetic flux to flow through the substrate and the thin film.

23. The magnetic tape of claim 22, wherein the thin film of the recording head is FeXN.

24. The magnetic tape of claim 22, wherein the thin film of the recording head is FeAlN.

25. The magnetic tape of claim 22, wherein the thin film of the recording head is FeTaN.

26. The magnetic tape of claim 22, wherein the gap pattern of the recording head is defined by a deposited layer of photoresist on at least a portion of the thin film, wherein the photoresist is masked and a portion of the photoresist is removed using photolithography.

27. The magnetic tape of claim 22, wherein the gap pattern of the recording head is defined by a visual indication of the pattern on the thin film.

28. The magnetic tape of claim 22, wherein the pattern of the recording head is defined within a control system of the focused ion beam.

29. The magnetic tape of claim 22, wherein the pattern of the recording head is defined within the control system by entering the numerical coordinates of the gap to be milled, wherein the visually defined pattern provides a reference point from which numerical coordinates are based.

30. The magnetic tape of claim 22, wherein the gap of the recording head has nearly vertical side walls.